

**Binomial Theorem**

Use the Binomial theorem to expand each binomial.

1.  $(3a - b)^3$  \_\_\_\_\_
2.  $(r + s)^4$  \_\_\_\_\_
3.  $(a + 3b)^5$  \_\_\_\_\_
4.  $(c - 1)^6$  \_\_\_\_\_
5.  $(1 - d)^7$  \_\_\_\_\_
6.  $(r^2 - s)^4$  \_\_\_\_\_

Find the specified term of each binomial expansion.

7. second term of  $(a + 2)^7$  \_\_\_\_\_
8. fourth term of  $(d - 3)^{10}$  \_\_\_\_\_
9. tenth term of  $(r + s)^{13}$  \_\_\_\_\_
10. third term of  $(d - 2)^9$  \_\_\_\_\_

Find the first three terms of each binomial expansion.

11.  $(a + b)^{15}$  \_\_\_\_\_
12.  $(c - d)^{17}$  \_\_\_\_\_
13.  $(c^2 - d^2)^9$  \_\_\_\_\_
14.  $(ab + 2)^{14}$  \_\_\_\_\_

Find the specified term of each binomial expansion.

15. fourth term of  $(a^2 - b^2)^{10}$  \_\_\_\_\_
16. eighth term of  $\left(\frac{c}{4} + d^2\right)^{11}$  \_\_\_\_\_
17. fifth term of  $\left(r + \frac{1}{3}\right)^8$  \_\_\_\_\_
18. eleventh term of  $\left(\frac{a}{2} - b\right)^{13}$  \_\_\_\_\_

**Applications**

19. **Business** The projections of advertising dollars to be spent over the next 5 yr is given by the five terms of the expansion  $(x + 2)^4$ , where  $x$  is the number of types of media used. Find the amount spent in the second year if 3 types of media are used. \_\_\_\_\_

**MIXED PRACTICE**

Find the specified term of each sequence.

20. 5, 8, 11, 14, ...;  $a_{11}$  \_\_\_\_\_
21. 2, 6, 18, 54, ...;  $a_9$  \_\_\_\_\_

Find the specified sum for each sequence.

22.  $1 + 6 + 11 + 16 + \dots$ ;  $S_{10}$  \_\_\_\_\_
23.  $27 + 9 + 3 + \dots$ ;  $S_7$  \_\_\_\_\_
24. Find the seventh term of  $\left(c - \frac{d}{2}\right)^9$  \_\_\_\_\_